Joint Statement of Dale N. Hatfield

Chief

Office of Engineering and Technology

&

Thomas J. Sugrue

Chief

Wireless Telecommunications Bureau

Federal Communications Commission

On

A Review of the FCC's Spectrum Policies for the 21st Century and

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Spectrum management is a core responsibility of the FCC, which has taken on heightened importance under Chairman Kennard's leadership. Spectrum is a finite and valuable national resource. Management of this scarce resource has become increasingly complicated over recent years. Explosive growth in new wireless services has stimulated demand. We are pleased to discuss spectrum management with the subcommittee today.[1]

Rapid advancements in radio technologies in recent years, particularly in the areas of integrated circuitry, signal processing and digital systems, have led to the development of a wide range of new radio communications technologies. The advent of these new technologies has been accompanied by increased demand for spectrum to permit the operation and growth of new radio services. These new services have included, for example, the personal communications services (PCS), advanced paging systems, intelligent transportation services (ITS), mobile satellite services (MSS) and two-way multichannel distribution service (MMDS) operation.

Today, we simply do not have enough spectrum to give everyone all that they want. This increasing demand is being propelled by a host of developments including the growing shift of our economy towards the service sector, the increasing mobility of our workforce, and the convenience and increased efficiency produced by mobile/portable communications combined with improved performance and falling cost of wireless devices. Increasing requirements for public safety and for national defense systems,

[1] The comments and views expressed in this Statement are offered in our respective capacities as Chief of the Office of Engineering and Technology and as the Chief of the Wireless Telecommunications Bureau and may not necessarily represent the views of the Commission or the individual FCC Commissioners.

satellite services, private users, amateur radio, and the dramatically growing interest in accessing the Internet are compounding the shortages of spectrum.

In today's highly competitive environment, our biggest job as spectrum managers is to find ways to avoid a spectrum drought that constrains the development of new technologies. The challenge we face is how to balance competing demands for scarce spectrum while striving to promote competition through the deployment of new technologies and services while ensuring that the public interest is best served.

Competition in the Wireless Marketplace

The FCC, consistent with the direction of Congress, is responding to the explosion of wireless demand by managing the spectrum, to the highest extent possible with a market-oriented approach. When Congress created the Commercial Mobile Radio Services (CMRS) in the 1993 Balanced Budget Act, it was with the mandate that the Commission should facilitate regulatory flexibility and promote market entry when writing its rules. This was based upon the belief that, in such an environment, the commercial wireless industry would develop into a vibrant marketplace known for innovation and intense competition.

In order to remain abreast of how commercial operators' business plans were unfolding, Congress has required the Commission to provide annual updates on the status of competition in the CMRS industry. This coming report, the fifth such one, will show that significant progress continues to be made towards Congress' goals. Competition

continues to develop in the mobile telephone industry. Just five years ago, consumers could choose from only two cellular carriers, which generally offered service on a local or regional basis and engaged in very limited, if any, competition for price, service packages, or quality. Today, nearly three-quarters of the U.S. population lives in areas where five or more mobile phone carriers are competing to offer service. More people are subscribing to mobile phone service every year, prices are falling, and subscribers are using their phones more often. In addition, six carriers have acquired extensive footprints and are offering their customers service packages that allow them to make calls from almost anywhere in the country without incurring roaming charges. Moreover, not only is mobile telephone service an emerging competitive alternative to wireline telephone service, it is an extremely valuable service in its own right, as more wireless subscribers choose their mobile telephone as their only telephone.

The past year has also seen significant developments in the emerging mobile data sector. Mobile telephone and other wireless carriers have begun to offer mobile data services such as Internet access. Many have also announced their plans to migrate to third generation (3G) networks so that they can offer these services at faster speeds. The paging industry is positioning itself as a competitor in the mobile data market by offering two-way, advanced services such as email and Web content updates. In addition, new protocols and technologies are being developed that will facilitate the growth of mobile data in the years to come.

3G and the WRC

Today, the next generation of mobile wireless services will likely include capabilities for multimedia applications and a wide range of services, in addition to voice, such as video-teleconferencing, high speed Internet, and high data rate offerings.

A major step forward for the next generation of wireless services was taken recently at the World Radio Conference (WRC) sponsored by the ITU in Istanbul in late spring 2000. The nations of the ITU have agreed to the identification of additional spectrum bands for possible use by IMT-2000. WRC-2000 adopted an approach based significantly on the multi-band, flexible approach to identifying spectrum for wireless services originally nurtured and fostered in the U.S. In the wake of the recent identification of multiple bands for IMT-2000 by the international community, the U.S. is evaluating whether additional spectrum could, or should, be made available for 3G services and other advanced mobile communications services in the United States. This task presents a major challenge to the FCC and the other parts of our government involved in these studies since all of the additional spectrum identified at WRC for 3G services is heavily encumbered in the United States. We hope that our efforts to make spectrum use more efficient and to make more spectrum available for new services will ensure that consumers needs are met both inside and outside the government.

Overview of Spectrum Management Principles

Spectrum is a valuable and finite public resource that must be allocated and assigned in a manner that will provide the greatest possible benefit to the American public. Consistent with the FCC's statutory obligations, we view our mission as ensuring that the radio spectrum is used efficiently and effectively. One of our principal jobs is to help to define policies that maximize the efficient use of the spectrum and promote the introduction of new services and technologies.

There are four major functions in spectrum management: allocation, service rules, assignment, and compliance/enforcement. The allocation of spectrum for particular uses and the development of specific technical and service rules governing those allocations is a crucial determinant of industry structure and performance. The means by which we assign spectrum is a critical factor in stimulating competition. Finally, our rules are only effective if we have a means to enforce compliance.

Over time, technological advances, growth in user demand, and the finite nature of spectrum have made our spectrum management responsibilities increasingly complex. To address the continuing growth of demand for radio services, we have focused our approach to spectrum management on allowing spectrum markets to make more efficient use of frequency bands through new technologies and on increasing the amount of spectrum available for use. In addition, we have sought to encourage the development and deployment of new, more spectrum-efficient technologies that will increase the

amount of information that can be transmitted in a given amount of bandwidth and to allow greater use of the spectrum occupied by existing services wherever possible.

We would like to briefly highlight the four major spectrum management initiatives currently underway at the commission.

(1) First, flexibility is increasing. We are seeking to promote flexibility in our spectrum allocations, *i.e.*, less restrictive service rules and harmonized rules for like services, in order to allow licensees to respond better to demand from customers.

(2) Second, is the development of new technologies. We are fostering the development of new spectrum efficient technologies such as Ultra-wideband (UWB) and Software-Defined Radios (SDR). This spring, we issued an NPRM on UWB and an NOI on SDR. Ultra-wideband (UWB) technology may offer us a wonderful opportunity to use spectrum more efficiently. This technology appears to be able to operate on spectrum already occupied by existing radio services without causing interference. SDR is a new generation of radio equipment under development that can be quickly reprogrammed to transmit and receive on any frequency within a wide range using virtually any transmission format. This new technology could change the way users can communicate across traditional services.

(3) Third, is promoting the use of higher frequencies. We are stepping up our efforts to explore the use of higher frequency spectrum. Just last week we convened a public forum to explore opportunities at the 90 GHz band. Until recently, the commercial

viability of equipment at this high a level was not feasible. Use of higher frequency spectrum may mitigate the congestion in high demand bands under 3 GHz.

(4) And fourth, is the development of secondary markets. We are exploring ways that the Commission can encourage more active secondary market trading in spectrum similar to what currently occurs in wireline bandwidth. Available capacity could be "leased" on a temporary basis to meet short or medium term demand for particular services. Such arrangements have tremendous potential for all of the parties involved. The lessor could gain revenues while maintaining control of spectrum that they feel is needed to meet their long-term strategic objectives. The leasee would be able to make a profit by providing services to otherwise under-served customers. Consumers would benefit from the availability of the service and manufacturers would benefit by the sale of more products. We, as regulators representing the public, would benefit from the greater and more efficient use of the spectrum resource that we have been charged with managing in the public interest. We convened a public forum in May with a broad range of representatives from industry and academia to gain insight into why there has not been active secondary trading and how the FCC could facilitate such activity. We are currently reviewing the results of the forum and gathering additional information and ideas. We hope to follow this effort with a more formal proceeding.

These initiatives represent a balanced approach that will help the Commission to meet the demand of new users. We cannot allow spectrum to constrain competition in new

mobile services. We must be innovative and aggressive in using spectrum more efficiently and making more spectrum available.

Auctions as an Efficient Assignment Tool – two examples

The primary tool used by the FCC to assign spectrum is our highly successful competitive bidding program. Since Congress gave the FCC the authority to conduct auctions late in 1993, we have seen wireless competition explode. Our experience with auctions has shown that Congress' decision to authorize this approach to assigning licenses was a sound one. The FCC auctions thousands of licenses each year with great success. Assignment through auctions has also proven to be the quickest method the Commission has used in putting licenses into the hands of those who value them most. Auctions have promoted the entry of new companies into telecommunications markets and stimulated the development of innovative wireless services. We have led the world in demonstrating that an efficient, transparent spectrum auctions process can work. The FCC has won awards and recognition worldwide for its innovative computerized simultaneous multiple round auction design, which allows large numbers of licenses to be auctioned at one time. In the United States, we have a number of major auctions planned in the coming months.

700 MHz

First, we have scheduled an auction of 36 MHz in the 700 MHz band for this fall. This is the television Channel 60-69 analog spectrum that Congress mandated the broadcasters return, after a transition period, in exchange for being given new spectrum

for digital television. Our approach to this band illustrates the FCC's thinking in the spectrum management area, and also demonstrates how difficult it can be to translate theory into consumer benefit.

The bandwidth available is highly valuable "beach front" property. It is well suited for a number of highly valuable uses, including high speed fixed Internet access that could compete with DSL and cable modems in the residential market, as well as high-bandwidth mobile services. We are all well aware that our decisions on the service rules for a new band like this affect who bids in the auction. We try to make our rules as technology-neutral as we can, and to let the market decide how licenses should be aggregated and which services will be the highest valued uses.

In response to the record, we created two licenses each in six different regions. We also allowed licensees to aggregate their licenses within a region. So, we might see aggregation within a region to provide fixed wireless, *i.e.*, Internet access, or geographic aggregation to provide mobile wireless. We recognize that even an auction which offers this much flexibility might still present challenges to potential bidders to obtain the spectrum they need to fulfill their business plan. So we are continuing to explore improved auction designs that would allow for bidding on packages of licenses, *e.g.*, *combinatorial bidding*. With package bidding, bidders would not be restricted to placing bids on individual licenses, but would also be allowed to place all-or-nothing bids on packages of licenses. This approach would allow bidders to better express the value of any synergies that might exist among licenses and to avoid the risks bidders face in trying

to acquire efficient packages of licenses. The FCC was instructed by the Congress in the 1997 Balanced Budget Act to test this licensing approach.

Also, with six megahertz of this spectrum we are testing a new concept called "guard band managers." Guard band managers will manage spectrum that buffers and protects adjacent public safety spectrum in the 700 MHz band. At the same time, they will serve as a useful market experiment because they will need no additional license authority to lease the spectrum to third parties, and will be able to respond to the ebb and flow of the market.

C/F Block

Another major upcoming auction involves some significant C and F block PCS licenses. These licenses were reserved for so-called "designated entities" or "entrepreneurs" when they were originally auctioned. Not surprisingly, the interest in this auction is intense because the available licenses, which can be readily used to provide cellular-like mobile telephone service, will include many major markets.

Many large service providers have asked us to conduct an "open auction" for this spectrum by lifting the "designated entity" classification for this spectrum, which restricted eligibility to bid in the original C and F block auction to smaller companies – specifically entrepreneurs with gross revenues of less than $125 million and total assets under $500 million. Needless to say, those providers who are eligible to bid under the original DE rules are arguing strenuously that we keep the rules in place for this auction. Both sides of the debate have also proposed various compromise approaches, by which

the DE restrictions would be kept in place for some subset of the licenses and lifted for others. At the same time, some of these DE providers are also urging that we lift the current transfer restrictions which prevent them from selling licenses they won in earlier C or F block auctions to entities who would have been ineligible to bid in those auctions. The FCC has released a Notice of Proposed Rulemaking in which it tentatively concluded that it should amend its rules to change the eligibility restriction for some but not all of the licenses and that it should address the transfer and assignment rules. A decision on this is expected early next month.

Spectrum Cap

Having discussed overall spectrum policy let me now turn my remarks to Congressman Stearns' bill on the CMRS spectrum cap. By my reading, this bill would eliminate the cap for spectrum auctioned after January 1, 2000, and for any of those licenses transferred or assigned thereafter.

The Commission in 1994 instituted the CMRS spectrum cap when the it was finalizing the service rules for broadband PCS. The cap applies to the 180 MHz of CMRS spectrum used by cellular, PCS and digital Specialized Mobile Radio (SMR) services predominantly to provide mobile voice, but increasingly to provide mobile data services and, in some cases, fixed services as well. It governs the amount of CMRS spectrum that can be licensed to a single entity within a particular geographic area. Under the cap, a single entity may acquire attributable interests in the licenses of cellular, broadband PCS, and digital SMR services that cumulatively do not exceed 45 MHz of

spectrum within the same urban geographic area, or 55 MHz within the same rural geographic area. The goal has been to prevent excessive concentration and promote active competition within each CMRS market by limiting the amount of this critical resource any one entity could control. In urban areas, for instance, no one entity can control more than 25% of the available CMRS spectrum; thus the cap ensures that there are at least four competitors licensed in each area.

The spectrum cap has played a vital role in ensuring the development of competition in the market, with all the benefits this brings to consumers. There remain significant reasons to be concerned about the effects of undue concentration of CMRS spectrum. For example, even in major metropolitan markets, where numerous competitors are offering mobile voice and data services, the two cellular carriers still have in excess of 70% of the customers in most markets. We recognize that this situation is changing as new entrants into these markets begin offering services and competing for customers. Nevertheless, many firms that have been awarded licenses are still in the early stages of their network build-out.

Last fall the Commission completed a review of the CMRS spectrum cap. It concluded that eliminating the spectrum cap <u>at this time</u> could lead to a reduction in competition through market consolidation. Specifically, following extensive review – which included analysis of the state of competition in CMRS markets – the Commission concluded that the public interest was best served by retaining the prime aspects of the spectrum cap. It found that the spectrum cap continued to serve several important purposes: promoting competition, preventing excessive concentration of licenses,

providing incentives for licensees to make more efficient use of their spectrum, encouraging innovation, and promoting dissemination of licenses among a wide variety of applicants.

In last fall's review, the FCC also recognized that adjustments to the spectrum cap rule were necessary to reflect market conditions. For instance, it revised the cap's attribution rules with respect to passive investors. These changes make it easier for carriers, especially small carriers, to raise capital. In addition, the FCC raised the spectrum cap to 55 MHz for rural areas. The FCC found that the economics of serving rural areas are different than are urban areas. In rural areas, there are fewer problems to permitting the spectrum to be held by a smaller number of players. We are not likely to have five, six, or seven carriers all offering competing services in rural markets, the way we do in urban markets and, as a result, the risks of anticompetitive conduct by foreclosing entry by permitting some greater degree of consolidation of spectrum are lower. A 55 MHz aggregation limit in rural areas will permit carriers serving these areas to achieve economies of scope and scale and will allow greater partnering between PCS and cellular in those areas, thereby helping to make competition in rural areas more vigorous. Such partnering might also further the deployment of PCS and other broadband services to rural areas.

The "bright line" aspect of the spectrum cap also promotes regulatory certainty and promotes regulatory efficiency. For instance, the cap greatly expedites the assignment of spectrum using auctions because it eliminates the need for case-by-case analysis of whether a carrier's bidding for, and acquisition of, spectrum in particular

markets would result in undue spectrum concentration. The cap also speeds the processing of transfers of control or assignment of licenses; in that context also, it provides clear guidance to parties involved in what the FCC is likely to find acceptable and what licenses they will likely have to spin-off. Thus, it enhances regulatory certainty and transparency for licensees and improves regulatory efficiency for the FCC.

Much has been said about the impact of the spectrum cap on the ability of CMRS carriers to provide advanced broadband mobile services. We all support and want to encourage the efficient and timely deployment of advanced mobile technologies. But we must also be cognizant of the risks of undue market consolidation if we allow CMRS carriers to aggregate spectrum in excess of the cap. In a system like ours that relies principally on market forces, not government mandates, to ensure the development and deployment of new wireless services and technologies, one must proceed cautiously before permitting substantial consolidation and reduced competition in wireless markets. Such consolidation would likely lead not only to higher prices, but also to reduced incentives for investment and innovation. Thus, we could well see a slower, not faster, rollout of advanced wireless services if we permit this to become a more concentrated, less competitive marketplace.

CMRS markets are rapidly changing. PCS is becoming available in more and more areas, PCS and digital SMR are attracting more and more subscribers, and market share differences between cellular and these new competitors are narrowing. Technology also is rapidly evolving. Current digital technologies are up to 20-25 times more efficient than analog technologies, and even the early implementation of 3G technologies promises

to double or triple that efficiency. While new services rapidly increase demand, new technologies help respond on the supply side. The FCC will continue to track these changes and report on the evolving level of competition in CMRS markets as part of its annual report on the state of CMRS competition. In the meantime, we will attempt to ensure that our policies are current and reflect the best interests of the American public in this rapidly changing environment.

Since issuing our most recent spectrum cap order last fall, we have sought additional ways of ensuring that broadband CMRS carriers could obtain needed spectrum for advanced services. For example, the FCC has stated that as it makes new spectrum available, it will consider whether to exempt that spectrum from the cap or otherwise adjust the cap. Certainly, additional spectrum provides a basis for liberalizing the application of the cap. As we make more spectrum available for 3G services, including by using some of the bands identified in the WRC, we will certainly consider how, if at all, to apply the spectrum cap to those new allocations. The first application of this approach came in January of this year when the FCC determined that the 30 MHz of spectrum to be auctioned this fall in the 700 MHz range would not be subject to a spectrum cap. But it made this decision in large measure because the CMRS spectrum cap helped ensure that a competitive structure in the CMRS marketplace was being maintained.

Also, with regard to the upcoming PCS C and F block auction, the Commission currently is considering allowing large carriers – many of whom argue for additional spectrum in the near future – the opportunity to bid for some of these licenses. Further,

we are considering whether to divide the 30 MHz C blocks into three blocks of 10 MHz, which would allow virtually all carriers to bid for at least some of these licenses in virtually all markets in order to gain additional spectrum and do so without any need to exceed the CMRS spectrum cap.

Where the spectrum cap truly interferes with a carrier's provision of advanced services, the Commission has endeavored to be flexible. In our 1999 spectrum cap order, we expressly invited carriers to submit waiver requests if they could credibly demonstrate that in a particular geographic area the spectrum cap was having a significant adverse effect on their provision of 3G or other advanced services. Carriers were asked to identify what additional services they would provide if the spectrum cap were waived, why such services cannot be provided without exceeding the cap, and any potential adverse effects of such a waiver, such as on competition in the relevant geographic market. While some carriers have requested general waivers of the cap, no carrier has submitted a specific request demonstrating the need for such a waiver in any <u>particular</u> market. But we stand ready to consider such waivers as we pursue the long-term solution of making spectrum available. Finally, even though our most recent review of the spectrum cap was completed just ten months ago, the FCC has committed to reviewing the cap before year's end.

Conclusion

All around the world, the growth in demand for wireless services has been unprecedented; and estimates are that by the year 2002 wireless users will number toward

one billion. An important part of this demand will come from anticipated new multimedia services and the Internet.

The nature of the wireless services is highly dynamic; and the mobile communications services of today, and certainly of those expected in the future, are a far cry from the first mobile telephony offerings of two decades ago. Wireless services have significantly progressed from early analog techniques, through major changes resulting from digital processing of the signals and advancements in miniaturization and portability of equipment.

The FCC must now attend to several different aspects of spectrum management to assure that next-generation mobile services are brought to the American public on a competitive basis, in a manner to permit efficient and orderly transition from earlier generation services, and with sufficient flexibility to permit operational and technological efficiencies. How all us involved in this dynamic field – including the Congress, the Executive Branch agencies, the FCC, and the industry -- respond to these challenges will determine how quickly we as a nation make progress to the next generation of mobile communications. We are confident that we can all meet this challenge.